AUTHOR: Basharin, G. P. SOV/2o-121-1-27/55

TITLE: A Probability Investigation of a Two-Stage Telephone System With a Busy Signal, Operating With Free Hunting (Teoretiko-veroyatnostnoye issledovaniye dvukhKaskadnoy telefonnoy systemy s otkazami, rabotayushchey v rezhime svobodnogo iskaniya)

PERIODICAL: Doklady Akademii nauk SSSR, 1958, Vol. 121, Nr 1, pp. 1o1—1o4 (USSR)

ABSTRACT: The author investigates a two-stage circuit with k selectors in the first stage and with m selectors in the second stage. The selector i of the first stage is assumed to have n_i inputs $(i = 1,2,\ldots,k)$ and m outputs; all selectors are assumed to have k inputs and ℓ outputs. The order of guarding the free lines is assumed to be arbitrary. The initial probabilities of the system at $t = 0$ are also assumed to be given. First the case with $\ell = 1$ is investigated. The transition probabilities of the process for a short interval of time Δt are derived. A system of differential equations with 2 limiting conditions A and B results from this. From the transitivity of the investigated Markov process the existence and the uniqueness of

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A Probability Investigation of a Two-Stage Telephone System With a Busy Signal, Operating With Free Hunting SOV/20-121-1-27/55

the final probabilities, which do not depend on the initial distribution of the probabilities, can be deduced. The physical importance of the final probabilities is explained by an ergodic theorem which is given in this paper. Formulae for the determination of the probabilities of the total number of busy lines are derived. There are 1 figure and 5 references, 4 of which are Soviet.

ASSOCIATION: Laboratoriya po razrabotke nauchnykh problem provodnoy svyazi Akademii nauk SSSR (Laboratory for the Elaboration of Scientific Problems in Wire Communication, AS USSR)

PRESENTED: December 17, 1957, by V.S.Kulebakin, Member, Academy of Sciences, USSR

SUBMITTED: December 15, 1957

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A Probability Investigation of a Two-Stage Telephone System With a Busy Signal, Operating With Free Hunting

SOV/2o-121-1-27/55

1. Multichannel telephone systems--Mathematical analysis 2. Perturbation theory

Card 3/3

AUTHOR: Basharin, G. P. SOV/20-121-2-24/53

TITLE: A Multidimensional Limit Distribution of Busy Line Numbers in the Tandem Selectors of a Second Stage Network of a Busy Signal Telephone System (O mnogomernom predel'nom raspredelenii chisel zanyatykh liniy v kommutatorakh vtorogo kaskada telefonnoy sistemy s otkazami)

PERIODICAL: Doklady Akademii nauk SSSR, 1958, Vol. 121, Nr 2, pp. 280 - 283 (USSR)

ABSTRACT: This paper gives a proof of the fact that the limit distributio of the numbers of busy lines in tandem selectors of a second stage network of a telephone system with two stages and busy signals operating with free hunting can be approximated by a density function which is normal and multidimensional under the condition that each tandem selector of the first stage is reached by a steady Poisson flux of calls, having a constant parameter λ and that the number of selectors in the first stage is sufficiently great. It is also assumed that the selectors in the first stage operate independently from each other and also independently of the selectors of the second

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A Multidimensional Limit Distribution of Busy Line Numbers in the Tandem Selectors of a Second Stage Network of a Busy Signal Telephone System

stage. This last condition is satisfied if in each of the selectors of the second stage the number of outputs is greater than the number of inputs or if they are equal. There are 5 references, which are Soviet.

ASSOCIATION: Laboratoriya po razrabotke nauchnykh problem provodnoy svyazi Akademii nauk SSSR (Laboratory for the Development of Scientific Problems of Wire Communication, AS USSR)

PRESENTED: January 29, 1958, by V. S. Kulebakin, Member, Academy of Sciences, USSR

SUBMITTED: January 29, 1958

Card 2/2

16(1) SOV/52-4-3-9/10

AUTHOR: Basharin, G.P.

TITLE: On a Statistical Estimate for the Entropy of a Sequence of Independent Random Variables

PERIODICAL: Teoriya veroyatnostey i yeye primeneniye, 1959, Vol 4, Nr 3, pp 361-364 (USSR)

ABSTRACT: Let $\xi_1, \xi_2, \dots, \xi_n, \dots$ be a sequence of independent random variables each of which assumes the value E_i with the probability p_i, $i=1,2,\dots,s$. For the estimation of the entropy of this sequence

(1) $$H(p_1,p_2,\dots,p_s) = -\sum_1^s p_i \lg_2 p_i$$

instead of the unknown a priori probability p_i mostly its estimation $\hat{p}_i = \frac{m_i}{N}$ is substituted, where m_i is the frequency of E_i. The author considers

(2) $$\hat{H} = H(\hat{p}_1,\dots,\hat{p}_s) = -\sum_1^s \hat{p}_i \lg_2 \hat{p}_i$$

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and shows that $\hat{H}$ is a biased, consistent and asymptotically normal estimate of H. The mean value and the dispersion of H are

(3) $E\hat{H} = H - \frac{s-1}{2N} \lg_2 e + O\left(\frac{1}{N^2}\right),$

(4) $D\hat{H} = \frac{1}{N}\left[\sum_1^s p_i \lg_2^2 p_i - H^2\right] + O\left(\frac{1}{N^2}\right).$

There are 5 references, 2 of which are Soviet, and 3 American.

SUBMITTED: February 16, 1959

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16.6100 S/052/60/005/002/003/003
C111/C222

AUTHOR: Basharin, G.P.

TITLE: The Congestion Time Limit Distribution for a Fully Available Group of Trunks

PERIODICAL: Teoriya veroyatnostey i yeye primeneniye, 1960, Vol.5, No.2, pp.246-252

TEXT: A fully available group of n trunks is considered under the assumption that a Poisson stream of calls with constant intensity λ is served. The fully available group is a loss-system. The holding time is independent of the stream of calls and has an exponential distribution with a mean holding time equal to 1. Under these assumptions the author describes the action of the considered group of trunks by a homogeneous Markov process N(t) with a continuous time and the states 0,1,...,n (cf.(Ref.1)). The process itself (cf. (Ref.2,3)) is defined by the matrix $A = \| a_{\alpha\beta} \|_0^n$, where

$$(1) \begin{cases} a_{\alpha\alpha} = -\lambda - \alpha, \; a_{\alpha,\alpha+1} = \lambda, \; a_{\alpha+1,\alpha} = \alpha+1, \; \alpha = 0,1,\ldots,n-1 \\ a_{nn} = -n, \; a_{\alpha\beta} = 0 \text{ for } |\alpha-\beta| \geqslant 2, \; \alpha,\beta = 0,1,\ldots,n \,. \end{cases}$$

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The Congestion Time Limit Distribution for a Fully Available Group of Trunks

The final probabilities p_α of $N(t)$ are given by

$$(2) \qquad p_\alpha = \frac{\lambda^\alpha}{\alpha!}\left[\sum_{\alpha=0}^{n} \frac{\lambda^\alpha}{\alpha!}\right]^{-1}, \quad \alpha=0,1,\ldots,n.$$

Let $\xi(t) = \{\xi_0(t), \xi_1(t), \ldots, \xi_n(t)\}$ be a random vector, where $\xi_\alpha(t)$ is the life time of the system in its α state $(\alpha=0,1,\ldots,n)$ during the time interval $[0,t]$. Let $A_{\alpha\alpha}$ be the principal minor of A corresponding to the element $a_{\alpha\alpha}$; $A_{\alpha\beta|\alpha\beta}$ be the principal minor of the order n-1 arising from A by a removal of the α-th and β-th rows and columns. Let $A_{\alpha\alpha|\alpha\alpha} \neq 0$. Let

$$(3) \qquad R_{\alpha\beta} = \frac{A_{\alpha\beta|\alpha\beta}}{\sum_{\alpha=0}^{n} A_{\alpha\alpha}}, \qquad R_\alpha = \sum_{\beta=0}^{n} R_{\alpha\beta} = \sum_{\beta=0}^{n} R_{\beta\alpha}, \qquad R = \sum_{\alpha,\beta=0}^{n} R_{\alpha\beta}.$$

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The Congestion Time Limit Distribution for a Fully Available Group of Trunks

Let $b_2^1 = 0$ and $b_2^{n+1} = n! \sum_{k=1}^{n} \frac{1}{k}$ $(n \geq 1)$.

Theorem 1: It holds

$$(15)\quad \frac{1}{p_o} R_\alpha = \sum_{s=0}^{\alpha-1} \frac{\lambda^s}{s!(\alpha-s)} + \left[\frac{b_2^{n+1}}{n!} - \frac{b_2^{\alpha+1}}{\alpha!}\right] \frac{\lambda^\alpha}{\alpha!} +$$

$$+ \frac{1}{n!} \sum_{s=\alpha+1}^{n-1} \left[\frac{n!}{s!} - \frac{(n-s+\alpha)!}{\alpha!}\right] \frac{\lambda^s}{s-\alpha},$$

where $\sum \equiv 0$ if the upper value of the summation index is smaller than the lower value.

Theorem 2: It holds

$$(19)\quad \frac{1}{p_o} R = \frac{b_2^{n+1}}{n!} + \frac{1}{n!} \sum_{s=1}^{n-1} \left\{\binom{n}{s} b_2^{n+1-s} - \sum_{\alpha=0}^{s-1} \frac{(n-s+\alpha)!}{\alpha!(s-\alpha)}\right\} \lambda^s + \frac{b_2^{n+1}}{n!} \sum_{s=0}^{n-1} \frac{\lambda^s}{s!}$$

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The Congestion Time Limit Distribution for a Fully Available Group of Trunks

and $\Sigma \geqq 0$ in the case mentioned in theorem 1. Besides, from a lemma it follows that it holds

$$(14) \qquad R_{\alpha\beta} = A_{\alpha\beta|\alpha\beta} \frac{p_0}{n!} .$$

Let M_γ be the sign of the mathematical expectation under the assumption that in the moment $t = 0$ the system was in the state γ. From (Ref.3) it follows that for $t \to \infty$

$$(4) \qquad M_\gamma \xi_\alpha(t) = t\omega_\alpha + O(1),$$

$$(5) \qquad M_\gamma \{\xi_\alpha(t) - t\omega_\alpha\}\{\xi_\beta(t) - t\omega_\beta\} = t\omega_{\alpha\beta} + O(1),$$

where $\omega_\alpha = \dfrac{A_{\alpha\alpha}}{\sum\limits_{\alpha=0}^{n} A_{\alpha\alpha}}$ and

$$(6) \qquad \omega_{\alpha\beta} = \omega_\alpha R_\beta + \omega_\beta R_\alpha - \omega_\alpha \omega_\beta R - R_{\alpha\beta} ,$$

Card 4/5 $\qquad \alpha, \beta = 0, 1, \ldots, n,$

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The Congestion Time Limit Distribution for a Fully Available Group of Trunks

(7) $$\omega_{\alpha\alpha} = \omega_{\alpha}(2R_{\alpha} - \omega_{\alpha}R).$$

Furthermore it follows that for an arbitrary initial distribution the distrubition of the vector

$$\eta(t) = \left\{0, \frac{\xi_1(t)-t\,\omega_1}{\sqrt{t\,\omega_{11}}}, \ldots, \frac{\xi_n(t)-t\,\omega_n}{\sqrt{t\,\omega_{nn}}}\right.$$

for $t \to \infty$ tends to one and the same nondegenerated normal distribution. The theorems permit the calculation of $\omega_{\alpha\alpha}$ and $\omega_{\alpha\beta}$ and therewith the practical application of the mentioned limit theorem and other ones following from (Ref.3).

There are 2 tables and 9 references: 7 Soviet and 2 Swedish.

[Abstracter's note: (Ref.2) is a paper of A.N.Kolmogorov in Uspekhi matematicheskikh nauk, 1938,&. (Ref.3) concerns S.Kh.Sirazhdinov, Limit Theorems for Homogeneous Markov Chains, Tashkent, 1955.]

SUBMITTED: June 13, 1959

Card 5/5

BASHARIN, G.P.

Derivation of equation of state systems for dual cascade loss-containing telephone circuits. Elektrosviaz' 14 no.1: 56-64 Ja '60. (MIRA 13:5)
(Telephone)

BASHARIN, G.P.

New approximation method for calculating the probability of losses in two-stage networks. Elektrosviaz' 14 no.9:52-63 S '60.
(MIRA 13:9)
(Telephone, Automatic) (Electric networks)

33501
S/562/61/000/009/001/012
D201/D302

9,7100 (9403)

AUTHOR: Basharin, G. P.

TITLE: Analytical determination and methods of evaluating the probability of loss in switching circuits

SOURCE: Akademiya nauk SSSR. Laboratoriya sistem peredachi informatsii. Problemy peredachi informatsii. No. 9, 1961. Elementy sistem avtomatiki, 5 - 47

TEXT: The author gives the results of research in developing methods of evaluating probability of loss in two cascade telephony circuits, as carried out by him during 1957-1960 at the Laboratoriya sistem peredachi informatsii AN SSSR (Laboratory of Information Transmission Systems of the AS USSR). The purpose was to develop from theory a method of determining the probabilities of loss which would be simple enough to be used in practice. The analytical determination of the probabilites of loss is developed from an analysis of the state space of a Markov process describing the operation of a switching circuit (a system of mass service) of arbitrary

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Analytical determination and ... S/562/61/000/009/001/012
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structure. The switching circuit receives independent simple call flows and its service time has an exponential distribution; for such a system a general theorem of the distribution of engaged system outputs is derived together with several consequences of its application. The methods described and results obtained may be used for algebraical, numerical and approximate evaluation of probability of loss in multi-tandem circuits and in single cascaded step-by-step switched telephony circuits. They may also be applied to the statistical evaluation of probability of loss by means of electronic analogue computers. The structural parameters of a two-tandem circuit are analyzed together with the multitude of its states. The definition of probability of loss is given according to type and space and properties of a quasi-Jacobian matrix established for the densities of transition of a Markov process describing the functioning of any arbitrary switching circuit. These properties are used to prove the theorem of the distribution of engaged system outputs. It is shown that for a particular case of statistical evaluation of probability of loss from the engaged condition time, it

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is enough to measure the time during which the circuit remains in states having different numbers of engaged outputs. Finally the author discusses the results of solving a system of state equations of the 112th order by means of computer M-20. The author acknowledges the cooperation of A. I. Cherkuniv, N. Ya. Volodina and N. N. Parfenova. There are 4 figures, 6 tables and 16 references: 11 Soviet-bloc and 5 non-Soviet-bloc. The references to the English-language publications read as follows: S. Carlsson and A. Elldin, Solving equations of state in telephone traffic theory with digital computers. Eric. Techn. 1958, v. 14, no. 2; E. Kosko. Matrix inversion by portioning. The Aeronaut. Quarterly 1957, v. 8, no. 2; C. Burke and M. Rosenblatt, A Markovian function of a Markov chain. Ann. Math. Stat. v. 29, no. 4, 1958.

Card 3/3

BASHARIN, Geliy Pavlovich; KHARKEVICH, A.D., otv. red.; BERKGAUT, V.G., red. izd-va; YEPIFANOVA, L.V., tekhn. red.

[Tables of probabilities and root-mean-square deviations of losses on a fully accessible pencil of lines]Tablitsy veroiatnostei i srednikh kvadraticheskikh otklonenii poter' na polnodostupnom puchke linii. Moskva, Izd-vo Akad. nauk SSSR, 1962. 127 p. (MIRA 15:9)

(Queuing theory)

Transactions of the 6th Conf. on Probability Theory and Mathematical Statistics and of the Symposium on Distributions in Infinite-Dimensional Spaces held in Vil'nyus, 5-10 Sep '60. Vil'nyus Gospolitizdat Lit SSR, 1962. 493 p. 2500 copies printed

Card 12/17

BASHARIN, G.P. (Moskva); SHVAL'B, V.P. (Moskva)

Use of the Monte Carlo method and electronic digital computers in simulating the action of switching circuits. Izv. AN SSSR. Otd. tekh. nauk. Energ. i avtom. no.3:143-153 My-Je '62. (MIRA 15:6)
(Switching theory) (Electric relays) (Electronic digital computers)

45683

S/106/63/000/002/006/007
A055/A126

6,2600

AUTHOR: Basharin, G.P.

TITLE: Investigation of switching systems in group selection range

PERIODICAL: Elektrosvyaz', no. 2, 1963, 58 - 67

TEXT: Assuming that the incoming flows of calls are independent and of the simplest kind, and that the handling time has an exponential distribution with unity as the average value, the author (this article being the continuation of his earlier article published in Elektrosvyaz',* no. 3, 1962) analyzes the space of micro- and macro-states for switching systems with explicit losses, operating in group-selection range. He examines, in the case of a one-way system (assumed symmetrical from the point of view of the switching possibilities in zero state for each of the incoming flows), several statistics for the estimation of the probability of losses. λ_{iu} being the intensity of the flow from the i-th input direction to the u-th output direction, the following statistics are examined: 1) Two statistics for the estimation of the probability of losses (time and intensity, respectively) for the flow (i, u):

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$$\hat{\pi}^{(1)}_{iu}(T) = \hat{c}_{iu}(T), \quad \hat{\pi}^{(2)}_{iu}(T) = \frac{\lambda_{iu} - \hat{\alpha}_{iu}(T)}{iu}; \tag{3}$$

2) two statistics for the estimation of the probability of the total flow:

$$\hat{\pi}^{(1)}(T) = \sum_{i,u} \frac{\lambda_{iu}}{\Lambda} \hat{c}_{iu}(T), \tag{4}$$

X

$$\hat{\pi}^{(2)}(T) = \sum_{i,u} \frac{\lambda_{iu}}{\Lambda} \left[1 - \frac{\hat{\alpha}_{iu}(T)}{\lambda_{iu}} \right] = 1 - \frac{\hat{\alpha}(T)}{\Lambda}, \tag{5}$$

where

$$\hat{\alpha}_{iu}(T) = \frac{1}{T} \int_{t_0}^{t_0+T} \alpha_{iu}(t)\, dt, \quad \hat{c}_{iu}(T) = \frac{1}{T} \int_{t_0}^{t_0+T} c_{iu}(t)\, dt \tag{2}$$

are, respectively, the average number of the handled calls of the flow (i, u) and the average relative blocking time of this flow in the interval (t_0, t_0+T); $\Lambda = \sum_{i,u} \lambda_{iu}$. The author examines next, in the case of dual systems, the difference existing between the spaces of states for group selection and free selection. The results of the author's analysis can be used in simulating the operation of switching systems with the aid of electronic computers. There are 1 figure and 6 tables.

SUBMITTED: March 15, 1961
after correction: December 13, 1961

BASHARIN, G.P.; SHNEPS, M.A.

Survey of recent work in the field of telephone communication.
Elektrosviaz' 17 no.5:41-48 My '63. (MIRA 16:4)
(Telephone)

BASHARIN, G.P.; SHNEPS, M.A.

Survey of some recently published papers on the theory of telephone communications. Elektrosviaz' 17 no.6:43-48 Je '63. (MIRA 16:7)

(Telephone)

[illegible] with the assumption that the dev[illegible] [illegible]

SUBMITTED: 00

BASHARIN, G.P. (Moscow)

A single server with a finite queue and items of several types.
Teor. veroiat. i ee prim. 10 no.2:282-296 '65.

(MIRA 18:6)

BASHARIN, Georgiy Prokop'yevich, doktor istor. nauk; SAFRONOV, F.G., kand. istor. nauk, otvetstvennyy red.; KUSTUROV, D.V., red. izd-va; PARNIKOV, Ye.S., tekhn. red.

[History of the incorporation of the Yakuts into the Russian agricultural system] Iz istorii priobshchenila iakutov k russkoi zemledel'cheskoi kul'ture. IAkutsk, Iakutskoe knizhnoe izd-vo, 1958. 50 p. (MIRA 11:8)

(Yakutia—Agriculture)

BASHARIN, Georgiy Prokop'yevich, prof.; SAFRONOV, F.G., otv. red.; D'YACHKOVSKAYA, L.S., red. izd-va; SOLOV'YEVA, Ye.P., tekhn. red.

[History of animal husbandry in Yakutia from the second half of the 19th century to the beginning of the 20th century]Istoriia zhivotnovodstva v IAkutii vtoroi poloviny XIX - nachala XX v. IAkutsk, IAkutskoe knizhnoe izd-vo, 1962. 126 p. (MIRA 16:1)

(Yakutia--Stock and stockbreeding)

BASHARIN, I.I.

Transporting alcohol in tank trucks. Spirt.prom.22 no.1:22-24 '56.
(MIRA 9:7)

1.Mordovskiy spirtovyy trest.
(Alcohol--Transportation)

BASHARIN, I.I.

Hauling alcohol from distilleries loacted at a distance from the railroads. Spirt. prom. 22 no.4:12 '56. (MLRA 10:2)

1. Mordovskiy spirtovoy trest.
(Alcohol--Transportation) (Tank trucks)

RAKOVSKIY, V.Ye.; ORSHANSKIY, R.B.; PARNOV, Ye.I.; VOLGINA, I.V.; ZBIRNOVA, V.M.; TOPUNOVA, A.I.; BASHARIN, I.Ye.

Thermal decomposition of certain hydrocarbons in the presence of iron oxide. Trudy Kal. torf. inst. no.13:140-143 '63.

Effect of the speed of heating and the size of particles on the thermal decomposition of milled peat. Ibid.:144-147

(MIRA 17:12)

BASHARIN, Sergey Vasil'yevich

[Kerch ore; history of the Kamysh-Burun Iron-Ore Combine]
Kerchenskaia ruda; iz istorii Kamyshburunskogo zhelezorudnogo
kombinata. Simferopol'. Krymizdat, 1960. 100 p.
(MIRA 14:7)

(Kerch--Iron mines and mining)

BASHARINA, A. A. PA 59/49T27

USSR/Medicine - Haff's Disease Feb 49
Medicine - Disposal and Purification of Sewage

"Haff's Disease (Yusovskiy's Disease) in the Karelo-Finnish SSR," A. A. Basharina, Z. V. Kurochkina, 4 pp

"Gig i San" No 2

In 1947 disease appeared in Ukshozero and Peska (on shores of Uksh Lake, Medvezh'yegorskiy Rayon). It is connected with the consumption of fish. Cats are also affected by this disease (mortality 100%). Examinations of lake fish revealed that perch and salmon acted as carriers.

[illegible] 59/49T27

BASHARINA, L. A.

Menyaylov, A. A., Naboko, S. I., Tabakov, N. D. and Basharina, L. A. - "The eruption of Shiveluch in the summer of 1946," Byulleten' vulkanol. stantsii na Kamchatke, No. 16, 1949, p. 3-11

SO: U-4355, 14 August 53 (Letopis 'Zhurnal 'nykh Statey, No. 15, 1949)

BASHARINA, L. A.

Verbatim: - "Study of Klyuchevsk and Shiveluch gaseous volcano products," Byulleten' Vulkanol. stantsii na Kamchatke, No. 16, 1949, p. 17-19

SO: U-4355, 14 August 53, (Letopis 'Zhurnal 'nykh Statey, No. 15, 1949.)

BASHARINA, L.A.

Research on gaseous products of Klyuchevskaya Sopka and Shiveluch Sopka during 1946-1947. Biul.Vulk.sta. no.18:31-40 '53.
(Shiveluch Sopka) (Klyuchevskaya Sopka) (MLRA 8:11)

BASHARINA, L. A.

Observations on the state of secondary crater fumaroles of the Klyuchevskaya and Shiveluch Sopkas during 1948-1949 Biul.Vulk. sta. no.19:51-59 '53. (MIRA 8:11)
(Klyuchevskaya Sopka) (Shiveluch Sopka)

BASHARINA, L.A.

Fumaroles of Shiveluch Sopka during September-December, 1953.
Biul.Vulk.sta. no.24:21-27 '56. (MLRA 9:10)

(Shiveluch Sopka)

BASHARINA, L.A.

Fumarole gases in the Klyuchevskiy and Sheveluch volcanoes. Trudy Lab. vulk. no.13:155-159 '58. (MIRA 12:3)
(Klyuchevskiy volcano--Volcanic ash, tuff, etc.)
(Sheveluch volcano--Volcanic ash, tuff, etc.)

BASHARINA, L.A.

Water and gases of ash clouds of the Bezymyannyy volcano. Biul. Vulk. sta. no.27:38-42 '58. (MIRA 11:10)
(Bezymyannyy volcano--Volcanic ash, tuff, etc.)

APPROVED FOR RELEASE: 06/06/2000 CIA-RDP86-00513R000203820004-2"

BASHARINA, L.A.

Fumarolic activity of the Bezymyannyy Volcano in 1956-1957.
Biul. Vulk. sta.no.29:15-27 '60. (MIRA 14:3)
(Bezymyannyy Volcano region--Fumaroles)

S/081/61/000/019/023/085
B101/B144

AUTHOR: Basharina, L. A.

TITLE: Fumarole activity of the Bezymyannyy Volcano in the years 1956 - 1957

PERIODICAL: Referativnyy zhurnal. Khimiya, no. 19, 1961, 91, abstract 19G86 (Byul. Vulkanol. st. AN SSSR, no. 29, 1960, 15 - 17)

TEXT: The activity of secondary fumaroles of the agglomerate flow was studied. The chemical composition of gases and condensates of fumarole gases is indicated. 0.65 - 18 g/liter of water vapor was found in the gaseous phase. Apart from air admixtures, 18 - 50% of fumarole gases was contained in dry gas: up to 43% of CO_2, up to 9.5% of CH_4, up to 3.5% of H_2S, and 0.05 - 0.35% of SO_2, COS, H_2. The unusual composition of the gas, which varies with time, is explained by interaction of the agglomerate flow with the snow-covered vegetation zone. The following was found in the condensates: SO_4^{2-} (up to 0.2660 g/liter); Cl^- (up to 0.0955 g/liter); Br^-; F^-; Na^+; K^+; Ca^{2+}; Mg^{2+}; Al^{3+}; Fe^{3+}; and H_3BO_3, H_2SiO_3, S; pH = 3.1

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Fumarole activity of the...

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- 4.5. The aqueous extracts of the ashes forming the fumaroles resemble the condensates in their composition. The chlorine-bromine coefficient in the extracts is smaller than in eruptive rocks. This is characteristic of exhalations in which sulfates predominate. [Abstracter's note: Complete translation.]

Card 2/2

BASHARINA, L.A.

Volcanic gases at different stages of the activity of volcanoes.
Trudy Lab.vulk. no.19:69-79 '61. (MIRA 14:9)
(Kamchatka—Volcanoes)

MARKHININ, Ye.K.; BASHARINA, L.A.; BORISOV, O.G.; BORISOVA, V.N.; PUGACH, V.B.; TIMERBAYEVA, K.M.; TOKAREV, P.I.

Study of the state of volcanoes of the Klyuchevskaya group and the Sheveluch Volcano in 1958-59. Biul.Vulk.sta. no.31:3-16 '61. (MIRA 15:2)

(Kamchatka--Volcanoes)

L 10411-67 FSS-2/EWT(1)/EWP(t)/EWT(m)/ETI IJP(c) DS/JD/WW 2
ACC NR: AP6029881 SOURCE CODE: UR/0413/66/000/015/0043/0043
52

AUTHORS: Tomashevskiy, F. F.; Lamedman, E. M.; Aksel'rod, Sh. S.; Gryadinskaya, V. P.; Dubnova, A. L.; Rozovskiy, V. M.; Basharina, Yu. I.

ORG: none

TITLE: Nonlamellar negative electrode of an alkaline iron-nickel battery. Class 21, No. 184300 [announced by plant "Leninskaya Iskra" (Zavod "Leninskaya Iskra")]

SOURCE: Izobret prom obraz tov zn, no. 15, 1966, 43

TOPIC TAGS: electrode, battery, potassium compound, iron, nickel

ABSTRACT: This Author Certificate presents a nonlamellar negative electrode of an alkaline iron-nickel battery. After reducing the iron oxides free of impurities, the electrode contains 40--70% of metallic iron in its active volume. To simplify the technique of its preparation by eliminating the operation of fusing, the potassium base is added to iron oxides before their reduction. Specific weight of the potassium base is 1.40--1.48 g/cm^3, and its amount is 0.5--5%.

SUB CODE: 10/ SUBM DATE: 10Sep65

Card 1/1 UDC: 621.355.8.035.222

L 23008-66 FSS-2/EWT(1)/EWT(m)/ETC(f)/EWG(m) JD/HW

ACC NR: AP6007662 SOURCE CODE: UR/0413/66/000/003/0031/0031

AUTHOR: Rozovskiy, V. M.; Fisher, T. L.; Basharina, Yu. I.; Chebakova, N. A. Kuz'min, V. A.; Maklyarskaya, A. A.; Avdeyeva, I. D.; Gavrilina, L. V.

ORG: none

51 B

27 27 29

TITLE: Iron-nickel alkaline battery. Class 21, No. 178401 [announced by the Scientific-Research Institute for Chemical Current (Nauchno-issledovatel'skiy institut khimicheskikh istochnikov toka)]

SOURCE: Izobreteniya, promyshlennyye obraztsy, tovarnyye znaki, no. 3, 1966, 31

TOPIC TAGS: battery, alkaline cell

ABSTRACT: An Author Certificate has been issued for an iron-nickel alkaline battery with lamellar-perforated electrodes of which the negative one is made from hydrogen-reduced iron. In order to increase the capacity at low temperatures and after prolonged discharge, the active mass of the iron electrode is supplemented with additions of antimony oxide and sulfide sulfur. The additions range from 2--4% for antimony oxide and 0.4--0.6 % for sulfide sulfur. The iron electrode is

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Card 1/2 UDC: 621.355.8

L 23008-66

ACC NR: AP6007662

produced in the form of lamellar tape with 16 to 18% open surface. [LD]

SUB CODE: 10/ SUBM DATE: 13Aug64/

Card 2/2 *pla*

APPROVED FOR RELEASE: 06/06/2000 CIA-RDP86-00513R000203820004-2"

AFANAS'YEV, Yu.T.; BASHARIN, A.K.; BASHARINA, N.P.; VOTAKH, O.A.; SOLOV'YEV, V.A.; KRASIL'NIKOV, B.N., otv. red.; PARFENOV, L.M., otv. red.

[Materials on tectonic terminology. Part 3..Tectonics and its division. Terms on structural geology.] Materialy po tektonicheskoi terminologii. Novosibirsk. Pt. 3. Tektonika i ee razdely. Terminy strukturnoi geologii. 1964. 255 p. (Its Trudy, no.34) (MIRA 18:4)

BASHARINA, V.N., inzh.

Transient processes in distributed nonlinear networks. Izv. LETI no.47:261-274 '62. (MIRA 16:12)

DASHAKINA, V. I.

BASHARINA, N.P.; BASHARIN, A.K.

Tectonic development of the eastern Verkhoyansk Range in the Paleozoic. Geol i geofiz. no.5:34-43 '63. (MIRA 16:8)

1. Institut geologii i geofiziki Sibirskogo otdeleniya AN SSSR, Novosibirsk.

(Verkhoyansk Range—Geology, Structural)

BASHARINOV, A.YE.

Category : USSR/Radiophysics - Statistical phenomena in radiophysics I-3

Abs Jour : Ref Zhur - Fizika, No 1, 1957, No 1809

Author : Basharinov, A.Ye.
Title : On the Noise Rejection of the Correlation Method of Reception

Orig Pub : Radiotekhnika, 1956, 11, No 5, 26-34

Abstract : An analysis of the relationships, characterizing the general case of correlation reception, based on obtaining an averaged product in the observation interval $z_T = \frac{1}{T}\int_0^T u_1(t)\, u_2(t+t_0)\, dt$

where $u_1(t) = A\cos(\omega t + \varphi) + u_{f1}$ is the voltage at the input of the receiver, $u_2(t)$ is the voltage at the output, and $u_2(t+t_0)$ is an auxiliary voltage, which is chosen similar to the expected value of the signal. Various versions of the correlation receivers are examined: coherent, dual-channel correlation, and auto-correlation. The average value of the dispersion and of the correlation function of the output voltage are calculated for the above receivers and comparative noise-rejection indices are derived for them. Calculations show that the noise rejection of the correlation incoherent receiver does not exceed by much ($\sqrt{2}$) the noise rejection of a receiver with a square-law detector. The highest noise rejection is obtained with a coherent receiver.

Card : 1/1

BASHARINOV, A.Ye., kand. tekhn. nauk, dots.

Distribution function enveloping the summation effect of an iregularly varying signal and of fluctuating interferences. Trudy MEI no.31:196-203 '56 (MIRA 13:3)
(Information theory)

BASHARINOV, A.Ye.

Answer to V.S.Voiutskii's remarks. Radiotekhnika 12 no.1:77 Ja '56. (MIRA 10:3)

(Radio--Receivers and reception)

BASHARINOV, A. Ye

SOV/142-58-4-29/30

AUTHOR: Stolyarov, A.G.

TITLE: All-Union Session Marking "Radio Day" (Vsesoyuznaya nauchnaya sessiya, posvyashchennaya "Dnyu Radio")

PERIODICAL: Izvestiya vysshikh uchebnykh zavedeniy - Radiotekhnika, 1958, Nr 4, pp 517-521 (USSR)

ABSTRACT: During the period May 12-17, 1958, an All-Union Scientific Session was held in Moscow, devoted to "Radio Day". It was organized by the Scientific Technical A.S.Popov Association for Radio-Engineering and Electro-Communications. 280 papers were read at the session, 25 in the field of information theory and more than 20 in the field of electronics, dealing with theoretical/experimental research on electronic equipment. V.I.Siforov spoke on "The Transmission Capacity of Single-Ray and Multi-Ray Communication Canals". L.I.Filippov looked at the potential interference resistance of an ideal radio receiver. D.A.Horik spoke on "The Transmission System of Electric Signals

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by the Optimal Code of Shannon-Fano." A. Ye.Basharinov and B.S.Fleyshman discussed "The Use of the Successive Analysis Method in Equipment for Determining Weak Signals in Noise", and L.M.Fink examined "The Potential Interference Resistance in a Non-Definite Signal Phase". V.A.Kashirin and G.A.Shustova discussed "The Optimal Parameters of the Tele-measuring System with regard to Interference Resistance". B.S.Fleyshman spoke on the question of creating an optimal code - in the Shannon conception - in the case of a binary symmetrical canal. L.F.Borodin discussed "The Method of Creating Several Codes with a Simple Base". In the field of electronics, P.A.Tarasov spoke on "Broad Band Electron Ray Tubes for Observation and Recording of Electric Impulses and Ultra-High Frequencies" and V.P.Radchenko examined the question of the practical utilization of tubes with a cathode net. G.F.Semenov, V.P.Sazonov, M.M.Shitneva and A.S.Bondarev examined: "Use of the Radiosonde with a High-Ohm Feed for Examining Electromagnetic fields in resonators and wave guides".

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and Yu. Katsman spoke on "The Selection of Oscillatory Energy of an Electronic Current, Modulated According to Density". M.B.Golant discussed a negative clystron with a wide range of electron adjustment. S.I.Bychkov explained the phenomenon of electron displacement and gave an approximate description of the frequency characteristics of the magnetron under conditions of high amplitude oscillations. A.I.Tereshchenko spoke on "The Influence of Various Factors on a Critical Magnetic Magnetron Field with a Grid",

A. I. Lebedev-Karmanov spoke on "Modern Television Stations" and V.M.Katushkina and Z.I.Model' discussed "Bridge Methods of Combining the Outputs of Several Generators".

G.Sh.Kevanishvili spoke on "The Theory of Non-Linear Oscillations in Radio Engineering".

V.A.Khromov and G.L.Suchkin spoke on "The Electro-magnetic Radiation in Systems not Conditioned by the Theory of Reciprocity in the Ultra-High Frequency Range". 21

BASHARINOV, A. Ye.

[illegible]

О пропускной способности многолучевых каналов связи.

Ю. М. Мартынов

К теории корректирующих кодов.

10 июня

(с 10 до 16 часов)

А. Е. Башаринов,
Б. С. Флейшман,
Г. С. Т[illegible]

Метод последовательного анализа в задачах обнаружения сигнала в многоканальных системах.

[illegible]

Элементы теории оптимальной помехоустойчивости систем с дискретными сигналами.

[illegible]

О помехоустойчивости одного способа определения временного положения импульсов.

Г. А. Сергеев

К вопросу об оптимальной обработке экспериментальных данных.

4

10 июня

(с 18 до 22 часов)

Ю. С. Лезин

О пороговых сигналах при многократных наблюдениях с экспоненциальной весовой функцией

[illegible]

Новые принципы анализа спектров.

Г. А. Медведев

Помехоустойчивость приемника с конечным временем восстановления. Случай простейшего потока мешающих сигналов.

[illegible]

О помехоустойчивости координатно-[illegible] метода передачи телевизионных сообщений

11 июня

(с 10 до 16 часов)

А. Е. Башаринов

Нарастающая вероятность обнаружения импульсного пакета переменной длительности

[illegible]

Нелинейное [illegible] устройство [illegible] сигналов.

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report submitted for the Centennial Meeting of the Scientific Technological Society of Radio Engineering and Electrical Communications im. A. S. Popov (VNORIE), Moscow, 8-12 June. 1959

SOV-109-3-6-19/27

AUTHORS: Basharinov, A. Ye. and Fleyshman, B. S.

TITLE: Efficiency of the Sequential Analysis Method in the Devices for the Detection of Weak Signals in Noise (Ob effektivnosti metoda posledovatel'nogo analiza v ustroystvakh obnaruzheniya slabykh signalov v shumakh)

PERIODICAL: Radiotekhnika i Elektronika, 1958, Vol 3, Nr 6, pp 835-839 (USSR)

ABSTRACT: The paper gives the calculated data which characterise the efficiency of various sequential analysers in the range of small errors and the data on the experimental investigation of the distribution of the duration of the analysis. The results are shown in Figs.1, 2 and 4. Fig.1 shows a typical detection characteristic $D(\rho)$ for $F = 10^{-4}$ and $D_1 = .5$ where F is the probability of a false indication (error), D_1 is the probability of a correct detection of a signal of expected intensity, ρ_1 is the expected signal-noise ratio and ρ is the unknown actual value of the signal-noise ratio. The characteristic of the average duration of the number of sampling tests for $D_1 = .5$ and $F = 10^{-4}$ is shown in Fig.2. An experimental curve of $N(\rho)$ is shown

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SOV-109-3-5-19/27

Efficiency of the Sequential Analysis Method in the Devices for the Detection of Weak Signals in Noise

in Fig.4 together with the calculated results; the crosses denote the experimental points. The measurements were done by means of the equipment shown in the block schematic of Fig.3 consisting of: 1)a noise-voltage generator, 2)a limiter, 3)a modulating pulse generator, 4) a computing device, 5) an integrating counter, 6) an audio-frequency generator, 7) a standard-duration pulse generator and 8) 2 control counters. The authors acknowledge the help extended to them by the Corresponding Member of the Soviet Academy of Sciences Yu. B. Kobzarev. The paper contains 4 figures and 4 English references.

SUBMITTED: October 24, 1957.

1. Radio signals--Detection 2. Noise (Radio) 3. Pulse generators - Applications 4. Radio receivers - Signal to noise ratio
Card 2/2 5. Mathematics - Applications

SOV/109-3-9-13/20

AUTHOR: Basharinov, A. Ye.

TITLE: Accuracy of the Logometric Method of Measurement when Used for the Observation of the Fluctuation Signals in the Presence of Gaussian Noise (O tochnosti logometricheskogo metoda izmereniy pri nablyudenii fluktuiruyushchikh signalov na fone Gaussovykh pomekh)

PERIODICAL: Radiotekhnika i elektronika, 1958, Vol 3, Nr 9, pp 1209-1212 (USSR)

ABSTRACT: In various radio-technical devices an accurate determination of the position of a signal is achieved by observing the signal in several measuring channels. One way of achieving increased accuracy is based on the so-called logometric method. For the purpose of the investigation of this method it is assumed that the signal voltages in the channels are of the fluctuating type and have the Rayleigh density distribution function, while the noise voltages are of the Gaussian type. If the output voltages are U_1 and U_2, the 2-dimensional density distribution function for U_1 and U_2 is given by Eq.(1), where α is a parameter which determines the displacement of a channel with respect to a symmetrical system. The density distribution of

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SOV/109-3-9-13/20

Accuracy of the Logometric Method of Measurement when Used for the Observation of the Fluctuation Signals in the Presence of Gaussian Noise

the ratio of the signals in the two channels, $P(\xi, \alpha)$, is expressed by Eq.(3), where $\xi = U_2/U_1$. If the α-characteristics are cosinusoidal (as represented by equations on p 1211), Eq.(3) is written as Eq.(4). The values of $P(\theta)$, as evaluated from Eq.(4), are plotted in Figs.1 and 2 for $\xi_0 = 1$ and $\xi_0 = 2$. The systematic errors of the system for the cosinusoidal characteristics are expressed by Eq.(8); the results are shown graphically in Fig.3. The paper contains 3 figures and 1 Soviet reference.

SUBMITTED: October 10, 1957.

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A052/A001

6.9400

Translation from: Referativnyy zhurnal, Elektrotekhnika, 1959, No. 14, pp. 237-238, # 30234

AUTHOR: Basharinov, A.E.

TITLE: Distribution Function of Envelope of Summary Response of Irregularly Changing Signal and Fluctuation Noises 25

PERIODICAL: Tr. Mosk. energ. in-ta, 1958, No. 31, pp. 196-203

TEXT: Probability distribution of the envelope of the signal and noise sum is the basic initial characteristic in the solution of the signal detection problem. At the same time it must be taken into account that due to the inconstancy of propagation conditions, instability of equipment parameters and other conditions, the signal amplitude is subject to random variations, that is it itself is distributed according to a certain law. Probability distributions of the envelope of the signal and noise sum are determined for cases of distribution of signal amplitude by Rice's and Raleigh's law. The first and the second moments of distribution are also determined. For distribution of signal amplitude by

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A052/A001

Distribution Function of Envelope of Summary Response of Irregularly Changing Signal and Fluctuation Noises

Rice's law

$$\omega_c(A) = \frac{A}{\sigma_c^2} \exp\left[-(A^2 + A_0^2)/2\sigma_c^2\right] \cdot I_0(AA_0/\sigma_c^2).$$

Distribution of the envelope of the signal and noise sum looks as follows:

$$\omega(R) = \frac{1}{\sigma_c^2 + \sigma_Ш} R \cdot \exp\left[-(R^2 + A_0^2)/2\sigma_c^2 + \sigma_Ш^2)\right] \cdot$$
$$\cdot I_0\left[A_0 R/(\sigma_c^2 + \sigma_Ш^2)\right].$$

and the first and the second moments of distribution are respectively:

$$\bar{R}_1 = (\pi/2)^{1/2}(\sigma_c^2 + \sigma_Ш^2) \exp(-q^2/2) \left\{I_0(q^2/2) + \right.$$
$$\left. + q^2\left[I_0(q^2/2) + I_1(q^2/2)\right]\right\};$$

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A052/A001

Distribution Function of Envelope of Summary Response of Irregularly Changing Signal and Fluctuation Noises

$$q = A_o^2/2\,(\sigma_c^2 + \sigma_ш^2);$$

$$\bar{R}_2 = A_o^2 + 2\,(\sigma_c^2 + \sigma_ш^2).$$

For distribution of signal amplitude by Rayleigh's law

$$\omega_c(A) = A/(\sigma_c^2 + \sigma_ш^2) \cdot \exp\,[-R^2/2\,(\sigma_c^2 + \sigma_ш^2)]$$

the following expressions are obtained:

$$\omega(R) = R/(\sigma_c^2 + \sigma_ш^2) \cdot \exp\,[-R^2/2\,(\sigma_c^2 + \sigma_ш^2)];$$

$$\bar{R}_1 = (\pi/2)^{1/2}\,(\sigma_c^2 + \sigma_ш^2)^{1/2}; \quad \bar{R}_2 = 2\,(\sigma_c^2 + \sigma_ш^2).$$

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Distribution Function of Envelope of Summary Response of Irregularly Changing Signal and Fluctuation Noises

Thus in the considered cases the distribution of the summary envelope repeats the law of distribution of signal amplitude.

B.I.K.

Translator's note: This is the full translation of the original Russian abstract.

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SOV/109-59-4-2-1/27

AUTHOR: Basharinov, A.Ye., and Fleyshman, B.S.

TITLE: Application of the Sequential Analysis Method in the Systems with Rayleigh Signal Intensity Fluctuations (Primeneniye metoda posledovatel'nogo analiza v sistemakh dvukhznachnoy peredachi pri releyevskikh fluktuatsiyakh intensivnosti signalov)

PERIODICAL: Radiotekhnika i Elektronika, 1959, Vol 4, Nr 2, pp 155-160 (USSR)

ABSTRACT: It is assumed that the intensity of the messages fluctuates in accordance with the Rayleigh distribution law and that the background noise is of the Gaussian type. The transmission is such that passive intervals are present. The probability density for the voltage at the output of a linear detector in the absence of a signal (that is during an interval) is in the form:

$$W_{sh}(u) = 2ue^{-u^2} \quad (A) \qquad \text{where } u = \frac{v}{\sqrt{\overline{v^2_{sh}}}} .$$

The probability density for the output voltage in the presence of the signal is given by:

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Application of the Sequential Analysis Method in the Systems with Rayleigh Signal Intensity Fluctuations

$$W_{ssh}(u) = \frac{2u}{1 + q^2} e^{-\frac{u^2}{1+q^2}} \qquad (B)$$

where q^2 is the signal-to-noise ratio. If a matched filter is used, a voltage u_i corresponds to each elementary message. The evaluation of an ensemble of independent voltages $u_1 \ldots u_i \ldots u_n \ldots$ which correspond to various messages is performed by forming a probability coefficient L, and comparing its value with two limits A and B at each n-th step; L is given by Eq.(1) while A and B are defined by Eq.(2), where D_1 is the probability necessary for a correct reproduction of the signal of a given amplitude and F is the permissible probability of a false alarm. For the case of the Rayleigh fluctuations of the signals having an expected intensity q_1, the logarithm of the probability coefficient is given by Eq.(3). The boundaries of the duration zone of the tests are defined by the inequalities expressed by Formula (4). According to Wald (Ref.4) the

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Application of the Sequential Analysis Method in the Systems with Rayleigh Signal Intensity Fluctuations

calculation of the probability characteristics and of the average analysing time (that is the average number of the tests) requires the determination of a parameter $h(q, q_1)$. This parameter can be determined from Eq (1) which leads to Eq (6). The solution of Eq (6) can be found graphically. The characteristic of a correct reproduction of the signal, $D(q)$, and the average number of the tests, $N_{cp}(q)$, are determined from Equations (7) and (8) where z is given by Eq (9). Typical characteristics of D and N_{cp} are shown in Fig.2 and 3. The efficiency of the method of successive analysis can be represented by coefficients which indicate the relative duration of the tests. In practical systems of sequential analysis, it is necessary to limit the duration of the tests. In this case it is important to know the distribution function of the test termination figure. An estimate of the lower probability limit of the test termination can be done by the method described by Wald (Ref 4) or by employing the Chebyshev inequality which is expressed by formula (11). In this, N denotes the upper number

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Application of the Sequential Analysis Method in the Systems with Rayleigh Signal Intensity Fluctuations

of tests and σ_N^2 is the spread of the number of tests. When $F \ll 1$ or $(1-D) \ll 1$, the spread can be determined from Eq (12). For $F \ll 1$ this leads to Eq (16) while for $(1-D) \ll 1$ this results in Eq (19). Consequently Formula (11) can be written as Eq (20). The calculated results of the estimate of the lower boundary of the probability that the tests would be terminated at a figure lower than the given one are illustrated in Fig.4. The curves denoted by I were evaluated from the Chebyshev inequality, while curves designated with II were evaluated from the Wald formulae (Ref 4). From the above analysis it is concluded that the method of sequential analysis can lead to an increased efficiency of the binary systems provided that an elementary message is transmitted as a train of identical elements. There are 4 figures, 1 table and 7 references of which 3 are Soviet and 4 English.

Card 4/4

BASHARINOV, A.Ye., doktor tekhn.nauk, red.; ALEKSANDROV, M.S., kand.tekhn. nauk, red.; VORONIN, K.P., tekhn.red.

[Reception of pulse signals in the presence of noise; collection of translated articles] Priem impul'snykh signalov v prisutstvii shumov; sbornik perevodnykh statei. Pod red. A.E.Basharinova i M.S.Aleksandrova. Moskva, Gos.energ.izd-vo, 1960. 381 p. (MIRA 14:1)

(Pulse techniques (Electronics))

30135
S/194/61/000/007/060/079
D201/D305

16.6100 (1031, 1253)

AUTHORS: Basharinov, A.Ye., Fleyshman, B.S. and Tyslyatskiy, G.S.

TITLE: The method of consecutive analysis in problems of signal detection in multi-channel system

PERIODICAL: Referativnyy zhurnal. Avtomatika i radioelektronika, no. 7, 1961, 7, abstract 7 I58 (V sb. 100 let so dnya rozhd. A.S. Popova, M., AN SSSR, 1960, 76-78)

TEXT: The structure is considered of the algorithm of sequential analysis in detecting m orthogonal signals (S). The algorithm consists in forming m channels which produce particular values Λ_s of the probability coefficient for the s-th form of S with consequent group weighting and comparison with the threshold. In the case of two alternatives the solution of the problem of S being present is reached with $\Lambda \geqslant D/F$, that of S being absent with $\Lambda < (1 - D)/(1 - F)$ where D - the probability of correct detection, F - probab- X

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The method of consecutive...

ility of false detection. The approximate expression for the average number of sampling has the following forms: in the absence of S

$$\bar{n}_{sa}(m) \simeq \bar{n}_{sa}(1) + k\frac{\ln m}{\bar{z}_{sa}}$$

and in the presence of S

$$\bar{n}_{s}(m) \simeq \bar{n}_{s}(1) + D\frac{\ln m}{\bar{z}_{s}}$$

where $\bar{n}_{sa}(m)$, $\bar{n}_{s}(m)$, $\bar{n}_{sa}(1)$ - the average number of samplings with one and m channels respectively, $\bar{z}_{sa}$, $\bar{z}_{s}$ - the average value of the algorithm of probability ratio at the first stage of sampling with m = 1, k - coefficient depending on allowable probability of false solutions. The evaluation of the average duration of sampling processes was carried out on a digital computer. The values thus determined were $0.5 < k < 2$ for a probability of the signal being transmitted of $\sim 10\%$. 5 references. [Abstracter's note: Complete translation]

Card 2/2

6.4700,6.9000

77947
SOV/109-5-3-1/26

AUTHOR: Basharinov, A. Ye.

TITLE: Detection of Pulse Packages of Random Duration by Devices With Limited Memory Capacity in the Presence of Noise

PERIODICAL: Radiotekhnika i elektronika, 1960, Vol 5, Nr 3, pp 355-359 (USSR)

ABSTRACT: (1) The optimum procedure of detecting a pulse package is Wald's two-threshold method of analysis. Since this system calls for an unlimited memory capacity, and a somewhat complicated algorithm, it is of importance to investigate simpler methods of processing with devices having a limited memory capacity. (2) Possible processing procedures for systems with limited memory are consecutive procedures based on the criterion "k out of m", where the detection is considered completed if at least k times

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during m consecutive counts the threshold was exceeded. (3) The cumulative probabilities of detection by criterion "k out of m" are given by the recursion formula:

$$W_n(k,m) = W_{n-1}(k,m) + f_n(k,m), \tag{1}$$

where $W_n(k,m)$ = probability of compliance with the criterion "k out of m" at least once for n counts; $W_{n-1}(k,m)$ = same probability of compliance with criterion "k out of m" the first time during the n-th count. Examples of application of equation (1): (a) Detection per criterion "m of m""

$$f_n(m,m) = q_{n-m}p_{n-m+1}\ldots p_n(1 - W_{n-m-1}), \tag{2}$$

(b) detection per criterion "2 of m""

$$f_n(2, m) = \sum_{i=1}^{m-1} q_{n-i-m+1} \cdots q_{n-i-1} p_{n-i}\, q_{n-i+1} \cdots q_{n-1}\, p_n (1 - W_{n-i-m}). \quad (3)$$

For m = 3:

$$f_n(2, 3) = q_{n-3}\, q_{n-2}\, p_{n-1}\, p_n (1 - W_{n-4}) + q_{n-4} q_{n-3} p_{n-2} q_{n-1} p_n (1 - W_{n-5}). \quad (4)$$

In case of detection per criterion "m of m" with additional condition of the occurence of s emissions in succession, the recursion formulas may be found by the method of generating functions. For detection per "one of n" the expression

$$f_n(1, n) = (1 - W_{n-1})\, p_n. \quad (5)$$

Detection of Pulse Packages of Random Duration by Devices With Limited Memory Capacity in the Presence of Noise

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In Eqs.(2)-(5) p_i denotes the probability of exceeding the threshold level on the i-th count, $q_i = 1 - p_i$. The transition from the recursion formula (1) for W_n to the functional dependence is accomplished by solving the respective equation by the method of finite differences, which for the criterion "one of n" transforms Eq. (1) into:

$$W_n(1, n) = 1 - \prod_{i=1}^{n}(1 - p_i). \qquad (7)$$

For the stationary case of uniform counts when $p_{i+s} = p_i$ is an equation with finite differences with constant coefficients, the respcetive methods can be applied to its solution. For detection per "m of m" (1) can be stated as:

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$$W^*_{n+m+1}(m, m) - W^*_{n+m}(m, m) + (1-p)\,p^m W^*_n(m, m) = 0, \tag{8}$$

where $W_1^* = 1 - W_1$. The solution of (8) is sought in the form of:

$$W^*_n = \lambda^n.$$

The characteristic equation is:

$$\lambda^{m+1} - \lambda^m + (1-p)\,p^m = 0, \tag{9}$$

the solution of which can be found by the method of approximations, which results for $\lambda = 1 - \varepsilon$ $(\varepsilon \ll 1)$ in:

$$\varepsilon \simeq (1-p)\, p^m, \tag{11}$$

and

$$W_n^*(m, m) \simeq [1-(1-p)\, p^m]^n. \tag{12}$$

Solutions for (2), (3), and (4) may be obtained analogously. (4) The comparison of efficiency of detection devices should be done under conditions of equal median frequency of spurious counts, which in many cases might be replaced by conditions of probability of absence of spurious counts during an interval containing a predetermined number of counts. This probability is denoted by $\left[W_n^*\right]_d$, and can be

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determined by solving the finite difference equations (type (8)). For the system working per criterion "m of m" from (12) for $p_d \ll 1$:

$$[W_n^*(m, m)]_d \simeq 1 - np_d^m. \tag{13}$$

For the system per "one of n":

$$[W_n^*(1, n)]_d \simeq 1 - np_d. \tag{14}$$

The normalizing condition of probability $\left[W_n^*\right]_d$ determines the shift of the threshold level, dependent on the selection of criterion. For nonfluctuating signals, the probability of exceeding the threshold levels by the voltage at the output of a circuit consisting of an optimum filter and linear detector is:

$$p_s = \int_{\sqrt{-\ln p_d}}^{\infty} 2ve^{-(q^2+v^2)} I_0(2qv)\,dv, \qquad (16)$$

where q^2 = energy ratio of signal-to-noise; $v = u/\sqrt{u_d^2}$. For Rayleigh-type fluctuations of signals, the probability of exceeding the threshold under conditions similar to (16) is:

$$p_s = p_d^{\frac{1}{1+q^2}}. \qquad (17)$$

The following equations give the relation between the probability of exceeding the threshold by noise bursts and the probability $p_d(1,n)$ for criterion "one of n":

$$p_d(m, m) = \sqrt[m]{p_d(1, n)}. \qquad (18)$$

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(5) For the case of a moving signal source, the variations of the cumulative probability of detection depend on the radial velocity of the source movement, mode of variation of the signal intensity, type of fluctuations, etc. Data for Figs. 2 and 3 were computed per (1) for nonfluctuating and fluctuating signals taking the change of intensity of echo-signals with distance into consideration. The probability of false detection for single counts was assumed $F = 10^{-6}$; the relative displacement of the object during the time interval between two pulses was taken as 10% of the nominal distance (corresponds to 50% probability of true detection). Figures 2 and 3 show that for a short duration of the received package (10 components) the criterion "one of n" is more effective than the more complicated types "2 of 2" and "2 of 3". The difference between the effectiveness of criteria increases in the region of low probabilities of signal

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Fig. 3. Cumulative probability of detecting package of echo-signals with independently fluctuating components reflected by approaching object ($F = 10^{-6}$, $\Delta R/R_0 = 10^{-1}$): (1) detection per single occurrence; (2) detection per criterion "2 of 2"; (3) detection per "2 of 3"; (4) detection per "one of n".

omission. A. M. Kharchenko helped. There are 3 figures; and 6 references, 4 Soviet, 2 U.S. The U.S. references are: B. Harris, A. Hauptschein, L. Schwartz, Optimum Decision Feedback Systems, Convent., Rec. I.R.E., 1957, 4, 3; G. Sponsler, First-Order Markov Process Representation of Binary Radar Data Sequences, I.R.E. Trans., 1957, IT-3, 1, 56.

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Card 14/14

KOBZAREV, Yu.B.; BASHARINOV, A.Ye.

Effectiveness of search algorithms based on a method of test steps with controlled duration. Radiotekh. i elektron. no.9:1411-1419 S '61. (MIRA 14:8)
(Electronic control)

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S/109/61/006/007/001/020
D262/D306

AUTHOR: Basharinov, A.Ye.

TITLE: Statistics of automatic pattern reproduction by means of sequential observation

PERIODICAL: Radiotekhnika i elektronika, v. 6, no. 7, 1961, 1035 - 1040

TEXT: In the present article the author considers, in six loosely related paragraphs, the statistical aspect of automatic pattern recognition arrangements. 1) In a system with a finite number of elements to be reproduced, the pattern represents a certain state of a group of elements. The limited capacity of the storage does not normally allow for parallel processing of all elements, and series processing is usually adopted, in which the elements in non-zero states only are sequentially scanned in the duration of one frame. In the simplest case the pattern consists of separate "spots" stationary during the observation period (pattern of "zero-order").

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With linear shift of spots within the interval of several frames the pattern is described by an equation of the first order. If a pattern is described by an equation of the n-th order it is said to be of the n-th order. 2) The reproducing apparatus selects signal pulses from the stream of interference pulses at the output of scanning system. Selection of signal sequence is achieved by logical assessment of data for several frames, according to a certain assumed criterion. The process of selection (assessment) can be represented as consisting of periods, related to the assessment of data obtained from separate patterns (either true or false). The duration of the period is a random quantity, with the distribution depending on the assumed algorithm of the selection. The algorithms of selection can be those which depend on the number of storage cells for one period, or algorithms with a fixed loading of storage in one period, or algorithms with increasing loading of storage during one period. 3) The character of capacity loading of the storage for algorithms of selection using a fixed number of storage elements during one period is determined as the average number of storage elements being used.

$$\overline{N(n)} = \sum_{s=s_0}^{n} \left[\sum_{k=0}^{\nu_s} \varepsilon_k (n, s) \right]. \tag{2}$$

where $E_k(n, s)$ is a random quantity, equal to either zero or one, depending on the loading of the element in the n-th frame, the storage element being first occupied in the s-th frame; ν_s - a random quantity determining the number of pulses in one frame. The limiting value of N(n) for $S_0 \longrightarrow -\infty$ determines the average loading of the memory capacity in a stationary state

$$\lim_{s_0 \to -\infty} \overline{N(n)} = \sum_{s=-\infty}^{n} \bar{\nu}_s [1 - F(n - s)] = \sum_{l=0}^{\infty} \bar{\nu}_l [1 - F(l)]. \tag{5}$$

If $\bar{\nu}_l$ = const then

$$\bar{\nu}_l \sum_{l=0}^{\infty} [1 - F(l)] \rightarrow \frac{\bar{\nu}_l}{\Delta t} \int_0^{\infty} [1 - F(t)] \, dt, \tag{6}$$

is obtained, e.g. in a stationary state

$$\bar{N} = \bar{\varkappa} \, \bar{t}, \tag{7}$$

where $\bar{\varkappa} = \bar{\nu}_l / \Delta t$ - the average density of input stream, $\bar{t}$ - average duration of observation (sampling). For loading the storage capacity by the stream of input interference (the input stream is characterized by the probability of the appearance of interference P_i and signal pulses P_s respectively), $\nu_e = mp_i$ and $\bar{N} = mp_i\,n$; i.e. the average number of memory elements occupied in the stationary state is determined by the product of the average density of interference stream and the average duration of some selection period (for a random distribution of period durations). 4) The magnitude of dispersion of the memory capacity loading and the probability of transmission owing to overloading in systems with finite capacities, can be determined by substituting a Poisson distribution stream having an equivalent average number of pulses per unit time (for the actual stream in the scanning system). A.Ya. Khinchin (Ref. 4: Matematicheskiye metody teorii massovogo obsluzhivaniya, Tr. Matem in-ta AN SSSR, 1955, 49) has shown that for the Poisson stream, assuming infinite capacity and random distribution of duration of scanning, the probability of K elements being loaded in stationary state is determined by Poisson's Law

$$p_k = \frac{(\bar{\nu}\,\bar{n})^k}{k!} e^{-(\bar{\nu}\bar{n})}, \qquad (8)$$

the average number of loaded elements being equal to the dispersion

$$\bar{N} = \sigma_N^2 = \bar{\nu}\,\bar{n}. \qquad (9)$$

5) When using algorithms requiring the loading of increasing num-

bers of elements during one period, the function f(s*) can be used for indicating the rate of increase in the number of loaded elements, whose function determines the actual instant after the beginning of the period. The number of loaded cells in the system will then be given by

$$N(n) = \sum_{s=1}^{n} f(n-s) \sum_{k=1}^{\nu_s} \varepsilon_k(n, s), \qquad (13)$$

where all symbols are as given in para. 3, from which

$$\bar{N} = \bar{\varkappa} \int_0^{\infty} f(t)[1 - F(t)]\,dt, \qquad (14)$$

can be derived, in which F(t) - the distribution function of duration of sampling of all elements, loaded during a period at instant t after its beginning. 6) In choosing the selection algorithms, the required memory capacity, complexity of reproduction etc. have to be considered. The algorithms can be established using single-

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and double-threshold criteria. A specific chracteristic of statistically optimal algorithms is the need for data storing over the whole of the period and it becomes possible to analyze a series of pulses of one channel (or one group of channels) over several frames. The simplest method of zero-order pattern selection is sampling with a single threshold to be exceeded (criterion "1 from n"). For reproduction of patterns of second etc. orders criteria, "; from e" are preferred. It is shown in appendix that considerable economy in the memory capacity loading can be achieved by using double-threshold sequential analysis. There are 10 references: 7 Soviet-bloc and 3 non-Soviet-bloc. The references to the English-language publications read as follows: N. Wax, Signal to noise improvement and the statistics of track population. J. Appl. Phys., 1955, 26, 5, 586; M. Schwartz, A coincidence proceedure for signals detection. IRE Trans. 1956, IT - 2, 4, 135; A. Wald. Sequential analysis, N.Y. 1947.

SUBMITTED: June 15, 1960

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BASHARINOV, A. E., Moscow Institute of Radio Engineering and Electronics - "On designs for automatic recognition of patterns in noise" (Section III)

BRAYNES, S. N., and SVECHINSKIY, V. B., Biocybernetical Institute, University of Moscow - "Matrix structure in stimulating of learning" (Section VII)

DOBRUSHIN, R. L., and TSYBAKOV, B. S., Moscow Institute of Radio Engineering and Electronics - "Information transmission with additional noise" (Section XI)

FLEYSHMAN, B. S., Moscow Institute of Radio Engineering and Electronics - "Basic theorems of the constructive information theory" (Section VIII)

NAPALKOV, A. V., Chair of Higher Nervous Activity, Moscow State University - "Mechanisms of the selection of useful and trustful information" (Section IX)

REPORT to be submitted for the International Symposium on Information Theory, Brussels, Belgium, 3-7 Sep 1962

BASHARINOV, A.Ye.; LEBEDEV, V.L., red.

[Principles of signal detection in noise] Printsipy selektsii signalov v shumakh;konspekt lektsii. Red. V.L. Lebedev. Moskva, Mosk. energ. in-t, 1962. 40 p. (MIRA 16:10)

(Radar) (Radio--Receivers and reception)

PHASE I BOOK EXPLOITATION SOV/6043

Basharinov, A. Ye., and B. S. Fleyshman

Metody statisticheskogo posledovatel'nogo analiza i ikh radiotekhnicheskiye prilozheniya (Methods of Statistical Sequential Analysis and Their Application in Radio Engineering) Moscow, Izd-vo "Sovetskoye radio," 1962. 352 p. Errata slip inserted. 10,000 copies printed.

Ed.: N. D. Ivanushko; Tech. Ed.: A. A. Sveshnikov.

PURPOSE: This book is intended for scientists and engineers working in radio engineering, automatic control, production control, and other related fields.

COVERAGE: Problems of the theory of statistical sequential analysis and the calculation of the characteristics of selection procedures in simple (two-alternative) and complex situations are considered. Examples are given for the application of sequential-analysis methods to problems of signal detection in noises, production control, theory of search, reliability

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control, etc. The mathematical apparatus used in the book does not exceed the scope of the theory of probability and mathematical analysis. Chs. 3, 4, 5, 6 and supplements I and III were written by A. Ye. Basharinov. Chs. 1, 2, 7, Supplements II and IV, and Appendix 1 were written by B. S. Fleyshman. The introduction was the work of both authors. Results not otherwise identified were obtained by the author of the particular section in which they appear. The authors thank Yu. B. Kobzarev, and Engineer G. S. Tyslyatskiy, Corresponding Members of the Academy of Sciences, USSR, A. S. Monin, Doctor of Physics and Mathematics, V. D. Zubakov, Candidate of Technical Sciences, and V. D. Guskova and Z. N. Malina, coworkers at the Institute of Radio Engineering and Electronics of the Academy of Sciences USSR. There are 106 references: 74 Soviet (20 of which are translations from the English), and 32 English.

TABLE OF CONTENTS:

Transactions of the 6th Conf. on Probability Theory and Mathematical Statistics and of the Symposium on Distributions in Infinite-Dimensional Spaces held in Vil'nyus, [illegible] Sep '60. Vil'nyus Gospolitizdat Lit SSR, 1962. 493 p. 2500 copies printed

LEZIN, Yuriy Sergeyevich; BASHARINOV, A.Ye., retsenzent; TIKHONOV, V.I., retsenzent; IVANUSHKO, N.D., red.; BELYAYEV, V.V., tekhn. red.

[Optimal filters and pulse signal storing devices] Optimal'nye fil'try i nakopiteli impul'snykh signalov. Moskva, Sovetskoe radio, 1963. 319 p. (MIRA 16:7)
(Electric filters)
(Pulse techniques (Electronics))

45324

S/109/63/008/001/001/025
D271/D308

64770

AUTHORS: Basharinov, A. Ye. and Akindinov, V. V.

TITLE: Optimal parameters of multi-scale measuring systems

PERIODICAL: Radiotekhnika i elektronika, v. 8, no. 1, 1963, 3-7

TEXT: Parameter evaluation in multi-scale measurements of range, direction and speed is considered in cases when signals are periodic functions of measured parameters; choice of scale factors, of the number of scales and the distribution of energy in measuring channels are analyzed. It is assumed that the form of the signal is known and the only unknown is the parameter to be measured. Normal law applies to the evaluation probability on all scales. Equations are written out for probability density of parameter distribution on all scales, assuming that each consecutive scale starts from the already obtained probability function of the previous scale. Evaluation probability, based on all scales, has a multimodal form and the envelope of intensity peaks is the probability function of the first, coarse scale. The criterion of the

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